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April, 1967

Dear Member:

Only a few years ago it was customary to speak of digital "computers" rather than of "systems." At that time the major objective was to perform computations. Today, computational facilities are only a relatively small part of the functions of what can be called a digital "system." In fact, in some rather large electronic digital systems, no computing at all--in the strict sense of the word--is performed. In today's "systems," the sorting and the detailed arrangement of data on printed forms are of primary importance, and data (or information) can be thought of as being genuinely "processed."

This month's Main Selection

ELECTRONIC DIGITAL SYSTEMS

by R.K. Richards

is a unique and comprehensive exploration of the fundamentals, concepts and ideas of a wide range of integrated digital systems for data processing.

In this 637-page volume, Dr. Richards has divided his subject into eleven beautifully logical areas, to each of which he devotes a chapter. In every case, the author skillfully relates both tomorrow's theoretical work and today's practical systems; in the case of the latter, the emphasis is always on the systems themselves rather than on how they are used.

Each chapter (and its accompanying extensive, categorized bibliography) is a veritable gold mine of new and unusual information, much of which has not appeared in book form before. For example, in his introductory chapter, the author enlivens his account of the historical development of the computer with details of a hitherto forgotten computer that antedated every other electronic digital computer by a matter of years. (This was the Atanasoff-Berry computer, built between 1938 and 1942 at Iowa State College at Ames, Iowa.)

Almost one-third of this highly informative book is devoted to the concept of the stored program, the most significant single feature of nearly all modern electronic digital systems. Today, as if to underline its fundamental importance, the stored-program concept is even finding its way into systems that superficially bear no relationship to computers at all--as, for example, telephone and message-switching systems. (continued on back page)

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This Month's Main Selection:

A trail-breaking exposition of the fundamentals, concepts, and ideas of...

ELECTRONIC DIGITAL SYSTEMS

By R. K. Richards

Here is a pioneering exposition of the fundamentals, concepts, and ideas pertinent to a wide range of digital systems. While most books in this area furnish piecemeal descriptions of a few specific machine designs, this one distills items of basic character from a mass of information. These items are sorted and arranged so that the reader is provided with ready access to every important scheme devised to meet the requirements of digital systems.

Dr. Richards skillfully demonstrates how the many major parts of an electronic digital computer — input-output devices, arithmetic units, storage units, storage registers, counters, switching networks, etc. — can be inter-related to achieve optimum efficiency from the standpoints of cost, speed, and ease of programming.

Nearly one-third of this volume is devoted to the most thorough presentation of the stored-program concept yet published. Here, the author reveals why almost all large modern digital systems are based on this concept, whether they have been designed for scientific computing, business accounting, process control, telephone switching, or any of the other widely divergent applications.

The material is applicable to all digital systems regardless of what each system's intended usage might be. Extensive bibliographies following each chapter are carefully categorized according to subject matter.

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(and partial Chapter Listings)

HISTORY AND INTRODUCTION

The Atanasoff-Berry Computer • Other Early Electronic Digital Systems • The ENIAC • The EDVAC • The EDSAC • The Computers at the University of Manchester • The SEAC • The ERA 1101 • The Institute for Advanced Study Computer • UNIVAC • Whirlwind • NORC • Other Computers of Historical Interest • Plugboard Programming • Magnetic Core Storage • The SAGE System • Transistors • Integrated Circuits • First-, Second-, and Third-generation Systems • Other Components • Introductory Remarks about Recent Systems • The Race to Achieve the Most Powerful Computer • Hardware and Software • The Relationship between Theory and Practice in Digital Systems Development

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From the Preface...

"... the objective of this book is to offer a much more thorough analysis of digital system functioning than was heretofore available... the approach was to study numerous actual digital systems and to extract and organize the pertinent concepts (or "ideas"). Because of the extremely large number of concepts or ideas which have been generated in connection with digital systems, this approach is possibly more difficult pedagogically than the "case study" approach of presenting one or a few specific machine designs. On the other hand, the approach used in this book avoids getting lost in the myriad of details which are necessary to make any specific system function properly but which are not relevant to the important principles of operation or design objectives. Of more consequence, collected and organized concepts form a much better systems "picture" and therefore a better foundation for future development."

About the Author:

R. K. RICHARDS is a consulting engineer who worked for seven years at I.B.M. Corporation where he invented and directed the development of the I.B.M. 632 electronic calculator. He also participated in the refinement of many of I.B.M.'s larger early computers and now holds 24 U.S. patents on various digital computer components, circuits, and systems.

Dr. Richards is the author of two widely used books, *Arithmetic Operations in Digital Computers* and *Digital Computer Components and Circuits*.

*This
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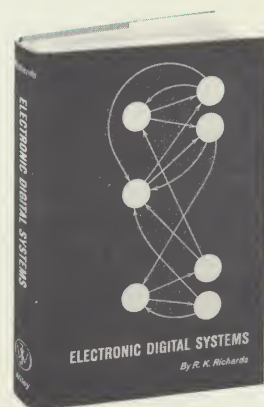
ELECTRONIC DIGITAL SYSTEMS

By R. K. Richards

Publisher's Price \$15.00

Members Price \$10.95

*plus one bonus credit toward the four
required for your next free Bonus Book*



No brief summary of this book could hope to capture the enormous variety of the subjects which Dr. Richards covers in detail in his treatment of stored programs, but the following is a brief sampling: word packing, instruction formats and modifiers, index registers, multiple indexing, control words, operand designation, "add," "jump," "skip," "execute" and other instructions, LIFO (last-in-first-out) and FIFO (first-in-first-out) storage units, modes, microprogramming, random-access storage, storage devices and access time, associative storage, input-output control, multiprogramming, parallelism, etc. It might be added that Dr. Richards' chapter on the stored program concept is as long as many books on the entire subject of computer systems.

Automatic programming--instructions which translate the notation of a problem as represented by the operator into a form compatible with the characteristics of a computer--is also discussed. In this extensive and natural sequel to the preceding chapter, ALGOL, COBOL, FORTRAN and other machine programming languages, list processing, compilers, program checking and flowchart preparation are all covered.

The remaining six chapters of ELECTRONIC DIGITAL SYSTEMS deal with information not previously available in book form: digital data transmission, the combining of analog and digital techniques, communication switching, the relationship between digital systems and thinking, and the use of computers in control systems (reservations, air traffic, ranging, etc.)--all presented in the same thorough fashion.

The author concludes with two lucid chapters on areas usually covered only in the most theoretical journal articles: digital system reliability and the use of digital systems to design other digital systems.

Dr. R.K. Richards is eminently qualified to make this authoritative presentation of a rapidly advancing subject. Associated with I.B.M. for seven years, he invented and directed the development of the IBM 632 electronic calculator. He also took part in the refinement of many of I.B.M.'s larger early computers and holds 24 U.S. patents on various digital computer components, circuits and systems. Now a consulting computer systems engineer, Dr. Richards is also the author of two classics in the computer sciences, Arithmetic Operations in Digital Computers and Digital Computer Components and Circuits.

Because of the author's wide-ranging experience and his concentration upon theory and practice, ELECTRONIC DIGITAL SYSTEMS will be a much used addition to the working library of everyone in the computer and information sciences. Engineers, systems designers, programmers, executives in organizations with computers or with computer-solvable problems, and even beginners in the field will find Dr. Richards' book an important, timely and highly valuable contribution.

Sincerely yours,

Martin Reynolds

Martin Reynolds
Executive Director